

Appl. No. 10/091,833
Amdt. dated May 28, 2003
Reply to Office action of January 29, 2003

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A method for increasing the total ion current produced from a liquid sample introduced into a mass spectrometer comprising the steps of:

- a. providing an array of spray emitters,
- b. providing said liquid sample in at least one reservoir formed on one side of said array,
- c. interfacing the opposite side of said array with the entrance to a mass spectrometer,
- d. forming an electrospray of said liquid sample at each opposite side of each emitter in said array, and
- e. directing said electrosprays into said entrance of said mass spectrometer,
- f. providing an ion funnel within the interior of the mass spectrometer and adjacent to the entrance to the mass spectrometer at the opposite side as said array of spray emitters,
- g. further directing the electrosprays through said ion funnel.

Claim 2 (original): The method of claim 1 wherein said entrance to said mass spectrometer is provided as a multi-capillary inlet.

Claim 3 (original): The method of claim 1 wherein said array of spray emitters is provided as fabricated on a single chip.

Claim 4 (currently amended): The method of claim 3 wherein said chip is fabricated by a method selected from the group consisting of laser etching, photolithographic patterning, wet chemical etching, laser ablation, plasma etching, casting, injection molding, and hot and cold stamping (embossing). -

Claim 5 (original): The method of claim 3 wherein said chip is fabricated from materials selected from the group consisting of polycarbonate, polyamide, polymethylmethacrylate, polyoxymethylene, cycloolefin copolymer, polyethylene, polypropylene, polystyrene, plastic, glass, silicon, and combinations thereof.

Claim 6 (original): The method of claim 1 wherein said reservoirs are interfaced with a liquid separation device.

Claim 7 (currently amended): The method of claim 6 wherein said liquid separation devices are selected from the group consisting of capillary electrophoresis devices, capillary isoelectric focusing devices, micro liquid chromatography, and nano column separation devices.

Claim 8 (original): The method of claim 1 further comprising the step of enhancing the hydrophobicity of the array by treating the surface with a CF₄ rf plasma.

Claim 9 (currently amended): A apparatus for increasing the total ion current produced from a liquid sample introduced into a mass spectrometer comprising:

- a. an array of spray emitters,
- b. at least one reservoir formed on one side of said array, and
- c. a mass spectrometer having an entrance, and having an ion funnel within the interior of the mass spectrometer and adjacent to the entrance to the mass spectrometer at the opposite side as said array of spray emitters.
wherein a liquid sample introduced into at least one of said reservoirs is formed into an electrospray at the opposite side of said array in at least two of said emitters, and said electrospray is then directed into said entrance of said mass spectrometer, and is further directed through said ion funnel.

Claim 10 (original): The apparatus of claim 9 wherein said entrance to said mass spectrometer is a multi-capillary inlet.

Claim 11 (original): The apparatus of claim 9 wherein said array of spray emitters is fabricated on a single chip.

Claim 12 (original): The apparatus of claim 11 wherein said chip is fabricated by a method selected from the group consisting of laser etching, photolithographic patterning, wet chemical etching, laser ablation, plasma etching, casting, injection molding, and hot and cold stamping (embossing).

Claim 13 (original): The apparatus of claim 12 wherein said chip is fabricated from materials selected from the group consisting of polycarbonate, plastic, glass, silicon, and combinations thereof.

Claim 14 (original): The apparatus of claim 9 further comprising a liquid separation device wherein said reservoirs are interfaced with a liquid separation device.

Claim 15 (original): The apparatus of claim 14 wherein said liquid separation device is selected from the group consisting of a capillary electrophoresis device, a capillary isoelectric focusing device, and a nano column separation device.

Claim 16 (original): The apparatus of claim 9 wherein the surface of the array is formed with a CF₄ rf plasma.